

CLAIMS

1. A valve gear comprising
a camshaft having a first valve gear cam and a second valve gear cam,
first and second rocker shafts arranged in a manner to interpose therebetween the camshaft,
a first rocker arm swingably supported on the first rocker shaft and having at one end thereof a roller bearing, which comes into rolling contact with the first valve gear cam, and
a second rocker arm swingably supported on the second rocker shaft and having at one end thereof a roller bearing, which comes into rolling contact with the second valve gear cam, and
wherein the first and second valve gear cams of the camshaft, respectively, comprise a base circle, and a cam nose projecting from the base circle, the first rocker shaft, which supports the first rocker arm, is positioned forwardly of a center line, which passes through a center of the camshaft to extend axially of a cylinder, in a direction of rotation of the camshaft, and the second rocker shaft, which supports the second rocker arm, is positioned rearwardly of the center line in the direction of rotation of the camshaft, and
wherein when the roller bearing of the first rocker arm contacts with the base circle of the first valve gear cam, the first rocker shaft is shifted closer to the camshaft than a

center of rotation of the roller bearing is.

2. The valve gear according to claim 1, wherein the roller bearing of the first rocker arm and the roller bearing of the second rocker arm, respectively, are offset relative to the center line of the cylinder in an axial direction of the camshaft, and the roller bearing of the first rocker arm is larger in offset relative to the center line than the roller bearing of the second rocker arm.

3. The valve gear according to claim 1 or 2, wherein the first rocker arm opens and closes at least one exhaust valve and the second rocker arm opens and closes at least one intake valve.

4. A valve gear comprising
a camshaft having a first valve gear cam and a second valve gear cam,

first and second rocker shafts arranged in a manner to interpose therebetween the camshaft,

a first rocker arm swingably supported on the first rocker shaft and having at one end thereof a roller bearing, which comes into rolling contact with the first valve gear cam, and

a second rocker arm swingably supported on the second rocker shaft and having at one end thereof a roller bearing, which comes into rolling contact with the second valve gear cam, and

wherein the first and second valve gear cams of the camshaft,

respectively, comprise a base circle, and a cam nose projecting from the base circle, the first rocker shaft, which supports the first rocker arm, is positioned forwardly of a center line, which passes through a center of rotation of the camshaft to extend axially of a cylinder, in a direction of rotation of the camshaft, and the second rocker arm, which supports the second rocker arm, is positioned rearwardly of the center line in the direction of rotation of the camshaft, and

wherein the relationship of relative positions of a center of the first rocker shaft, a center of rotation of the roller bearing of the first rocker arm, and a center of rotation of the camshaft is prescribed so that the first rocker arm does not buckle when the cam nose of the first valve gear cam contacts with the roller bearing of the first rocker arm to cause the first rocker arm to swing in a valve opening direction.

5. The valve gear according to claim 4, wherein the following relationship is satisfied

$$\theta_1 > \theta_2$$

where θ_1 indicates an intersecting angle between a line, which connects between the center of the first rocker shaft and the center of rotation of the roller bearing of the first rocker arm, and a line, which connects between the center of rotation of the camshaft and the center of rotation of the roller bearing of the first rocker arm, and θ_2 indicates an intersecting angle between a line, which connects between a center of the second

rocker shaft and a center of rotation of the roller bearing of the second rocker arm, and a line, which connects between the center of rotation of the camshaft and the center of rotation of the roller bearing of the second rocker arm.

6. The valve gear according to claim 5, wherein the intersecting angle θ_1 is larger than 90 degrees and the intersecting angle θ_2 is smaller than 90 degrees.

7. The valve gear according to any one of claims 4 to 6, wherein the first rocker arm opens and closes at least one exhaust valve and the second rocker arm opens and closes at least one intake valve.

8. A four-cycle engine comprising
a cylinder having a bore center line,
a cylinder head connected to the cylinder and having an exhaust valve and an intake valve,
a camshaft supported by the cylinder head and having a first valve gear cam and a second valve gear cam,
first and second rocker shafts arranged in a manner to interpose therebetween the camshaft,
a first rocker arm swingably supported on the first rocker shaft and having at one end thereof a roller bearing, which comes into rolling contact with the first valve gear cam, the first rocker arm acting to drive one of the exhaust valve and the intake valve, and
a second rocker arm swingably supported on the second

rocker shaft and having at one end thereof a roller bearing, which comes into rolling contact with the second valve gear cam, the second rocker arm acting to drive the other of the exhaust valve and the intake valve, and

wherein the first and second valve gear cams of the camshaft, respectively, comprise a base circle, and a cam nose projecting from the base circle, the first rocker shaft, which supports the first rocker arm, is positioned forwardly of the bore center line, which passes through a center of the camshaft, in a direction of rotation of the camshaft, and the second rocker shaft, which supports the second rocker arm, is positioned rearwardly of the bore center line in the direction of rotation of the camshaft, and

wherein when the roller bearing of the first rocker arm contacts with the base circle of the first valve gear cam, the first rocker shaft is shifted closer to the camshaft than a center of rotation of the roller bearing is.

9. The four-cycle engine according to claim 8, wherein the exhaust valve and the intake valve, respectively, comprise a valve stem, and the first rocker arm and the second rocker arm, respectively, comprise the other end to push the valve stem, and

wherein the cylinder head comprises a first opening to expose abutting portions of the other end of the first rocker arm and the valve stem, and a second opening to expose abutting

portions of the other end of the second rocker arm and the valve stem, the first opening and the second opening being arranged to be opposed to each other with the bore center line therebetween and covered by respective common removable covers, and

the covers comprise first and second walls on inner surfaces thereof, which are opposed to the abutting portions, to receive a lubricating oil, the first wall being formed with supply ports, through which the lubricating oil is conducted to the abutting portions of the other end of the first rocker arm and the valve stem, and the second wall being formed with supply ports, through which the lubricating oil is conducted to the abutting portions of the other end of the second rocker arm and the valve stem.

10. A motorcycle comprising a frame, and
a four-cycle engine supported on the frame,
the four-cycle engine comprising
a cylinder having a bore center line,
a cylinder head connected to the cylinder and having an exhaust valve and an intake valve,
a camshaft supported by the cylinder head and having a first valve gear cam and a second valve gear cam,
first and second rocker shafts arranged in a manner to interpose therebetween the camshaft,
a first rocker arm swingably supported on the first rocker shaft and having at one end thereof a roller bearing, which

comes into rolling contact with the first valve gear cam, the first rocker arm acting to drive one of the exhaust valve and the intake valve, and

a second rocker arm swingably supported on the second rocker shaft and having at one end thereof a roller bearing, which comes into rolling contact with the second valve gear cam, the second rocker arm acting to drive the other of the exhaust valve and the intake valve, and

wherein the first and second valve gear cams of the camshaft, respectively, comprise a base circle, and a cam nose projecting from the base circle, the first rocker shaft, which supports the first rocker arm, is positioned forwardly of the bore center line, which passes through a center of the camshaft, in a direction of rotation of the camshaft, and the second rocker shaft, which supports the second rocker arm, is positioned rearwardly of the bore center line in the direction of rotation of the camshaft, and

wherein when the roller bearing of the first rocker arm contacts with the base circle of the first valve gear cam, the first rocker shaft is shifted closer to the camshaft than a center of rotation of the roller bearing is.